

Chapter 10. Eggplant Production in Florida

B.M. Santos, W.M. Stall, S. Zhang, S.E. Webb, S.A. Smith, E.J. McAvoy and
M. Ozores-Hampton

BOTANY

Nomenclature

Family - Solanaceae

Eggplant - *Solanum melongena*

Origin

Eggplant is native to India where the major domestication of large-fruited types occurred (Fig. 10-1). It spread eastward to China which became a secondary site of domestication for small-fruited types. The name, eggplant, probably was derived from types that produced white fruit that looked like chicken eggs.

Related Species

Other vegetable crops in the Solanaceae family are tomato, pepper, potato, tomatillo, and pepino. Several field and ornamental crops also are included in this family.

VARIETIES

Classic - Erect, vigorous plant glossy, glossy deep purple-black elongated oval, green calyxed fruit, medium tall upright plant, fancy fruit appearance Heavy yields of high quality fruit. Does not perform well in cooler weather. R to ToMV.

Epic – Oval shape, early maturing, green calyx, upright plant, high yield potential and deep purple-black color. Widely adapted. R to ToMV.

Nadia – Oval long, Vigorous plant with good fruit set under cool conditions. Very firm, attractive, purple-black fruits with long harvest period, and set well under cool conditions.

Night Shadow – Elongate oval, widely adapted with high yield potential. Strong plants produce firm fruits which maintain rich, dark glossy black color right through harvest. R to ToMV.

Santana - Tall, upright plant with few spines, firm, white flesh, glossy black-purple exterior with attractive bright green calyx. Continuous setting.

Triviata – The fruits are half-long in shape, very uniform in size and very attractive shiny purple in color. Strong growing, well balanced plant.

Specialty Eggplants

Zebra – Elongated oval, purple with white stripes, very attractive with good flavor.

Megal – Italian cylindrical fruit, purple black color, very uniform, excellent shelf life and flavor, few spines, early maturity. R to CMV, TMV.

Victoria – Very long cylindrical, deep purple Imperial type, green calyx, mild flavor. R to TMV.

Millionaire - Slender, oriental type, dark purple fruit color, purple calyx, early maturing.

Rosita - Large size, very prolific, white flesh, deep rose color.

Italian pink - Open pollinated cultivar, oval fruit, cream/rose color, mature fruit color is rose pink, purple calyx.

Birgah - A Sicilian style eggplant with a round, heavy, firm fruit, deep purple color and sweet taste and white flesh.

Disease Key

ToMV - Tomato mosaic virus

R - Resistant

IR - Intermediate Resistance

T - Tolerant

CMV - Cucumber mosaic virus

SEEDING AND PLANTING

Eggplant is extensively intercropped with strawberry in west central Florida beginning on late January or early February. Planting dates and seeding information are given in Table 1.

PRUNING

Many eggplant varieties need light pruning to remove the ground suckers, leaving two main stems. While heavy pruning tends to reduce fruit setting and yields, no pruning may exacerbate foliar growth and excessive number of side stems may reduce flowering. This operation generally occurs between 2 and 3 weeks after transplanting.

FERTILIZER AND LIME

For unmulched crops, broadcast all P_2O_5 , micronutrients, and 25 to 50% N and K_2O before planting. Fertilizer efficiency can be increased if fertilizer is applied in the bed area or banded. Remaining N and K_2O is sidedressed in one or two split applications of 40 to 50 lbs each during the early growth period. Supplemental applications of 30 lbs N and 20 lbs K_2O can be banded to replace leached N and K. See Table 2 for mineral soil test and fertilizer recommendations.

Table 1. Seeding and planting information for eggplant.

Planting dates	
North Florida	Aug Feb - Mar
Central Florida	Aug - Sept Jan - Feb
South Florida	Aug - Feb
Planting information	
Distance between rows (in)	36 - 72
Distance between plants (in)	18 - 40
Seeding depth (in)	0.5-0.75
Seed per acre to field (lb)	1
Seed per acre to transplant (lb)	0.25 - 0.50
Days to maturity from seed	90 - 115
Days to maturity from transplant ¹	70 - 90
Plant population (acre) ²	9,680

¹ Transplanting recommended

² At closest plant and row spacing

For mulched crops with subsurface irrigation, broadcast all P_2O_5 , micronutrients, and 20 to 25% of the N and K_2O in the bed area. Place the remaining N and K_2O in two bands in grooves on the bed shoulders 9 to 10 inches from the row. For mulched crops with sprinkler irrigation, incorporate all fertilizer in the bed under the mulch. For drip-irrigated crops, broadcast all P_2O_5 , micronutrients, and up to 20 to 25% of the N and K_2O in the bed (Fig. 10-2). Inject the remaining N and K_2O through the tube according to the schedule given in Table 3.

PLANT TISSUE ANALYSIS

Plant tissue analysis information for eggplant is given in Table 4. The analysis was done during early fruit set, using the most recently matured leaf.

PETIOLE SAP TESTING

Fresh sap can be pressed from leaf petioles and analyzed for nitrogen and potassium concentrations. Results can be used to make adjustments in the fertilization program. Sufficiency ranges for sap testing for eggplant are presented in Table 5.

IRRIGATION

Eggplant water requirements (see Chapter 3, *Principles and Practices of Irrigation Management for Vegetables*, Tables 4 to 6) peak at reference levels (100% of ETo) (see Chapter 3, *Principles and Practices of Irrigation Management for Vegetables*, Table 3) and decrease to 85% of ETo during the final growth period. Plants may have extensive root systems, thus permitting less frequent irrigation applications, especially during low evaporative demand periods.

WEED MANAGEMENT

Herbicides labeled for weed control in eggplant are listed in Table 6.

DISEASE MANAGEMENT

Chemicals approved for disease management use on eggplant are listed in Table 7.

INSECT MANAGEMENT

Table 8 outlines the insecticides approved for use on insects attacking eggplant.

PRODUCTION COSTS

Production costs for eggplant in Palm Beach County are given in Table 9.

Table 2. Soil test and fertilizer recommendations for mineral soils for eggplant on 6-foot centers.¹

Target pH	N lb/A	VL	L	M	H	VH	VL	L	M	H	VH
		P ₂ O ₅					K ₂ O				
		(lb/A/crop season)									
6.5	200	160	130	100	0	0	160	130	100	0	0

¹ See Chapter 2 section on supplemental fertilizer application and best management practices, pg 11.

Table 3. Fertilization recommendations for eggplant grown in Florida on sandy soils testing very low in Mehlich-1 potassium (K₂O)

Production system	Nutrient	Recommended-Supplemental fertilization ^z						Recommended-Supplemental fertilization ^z		
		Total (lbs/A)	Preplant ^y (lbs/A)	Injected ^x (lbs/A/day) Weeks after transplanting ^w				Leaching rain ^{t,s}	Measured "low" plant nutrient content ^{u,s}	Extended harvest season ^{u,s}
				1-2	3-4	5-10	11-13			
Drip irrigation, raised beds, and polyethylene mulch (on deep sands or on soils with shallow impermeable layer)	N	200	0-70	1.5	2.0	2.5	2.0	n/a	1.5 to 2 lbs/A/day for 7 days	1.5 to 2 lbs/A/day
	K ₂ O	160	0-55	1.0	1.5	2.5	1.5	n/a	1.5 to 2 lbs/A/day for 7 days	1.5 to 2 lbs/A/day
Seepage irrigation, raised beds, and polyethylene mulch (on soils with shallow impermeable layer)	N	200	200	0	0	0	0	30 lbs/A	30 lbs/A	30 lbs/A
	K ₂ O	160	160	0	0	0	0	20 lbs/A	20 lbs/A	20 lbs/A

^z A=7,260 linear bed feet per acre (6-ft bed spacing); for soils testing "very low" in Mehlich 1 potassium (K₂O) Seeds and transplants may benefit from applications of a starter solution at a rate no greater than 10 to 15 lbs/acre for N and P₂O₅, and applied through the plant hole or near the seeds.

^y Applied using the modified broadcast method (fertilizer is broadcast where the beds will be formed only, and not over the entire field). Preplant fertilizer cannot be applied to double/triple crops because of the plastic mulch; hence, in these cases, all the fertilizer has to be injected.

^x This fertigation schedule is applicable when no N and K₂O are applied preplant. Reduce schedule proportionally to the amount of N and K₂O applied preplant. Fertilizer injections may be done daily or weekly. Inject fertilizer at the end of the irrigation event and allow enough time for proper flushing afterwards.

^w For standard 13 week-long, transplanted eggplant crop.

^v Some of the fertilizer may be applied with a fertilizer wheel though the plastic mulch during the eggplant crop when only part of the recommended base rate is applied preplant. Rate may be reduced when a controlled-release fertilizer source is used.

^u Plant nutritional status may be determined with tissue analysis or fresh petiole-sap testing, or any other calibrated method. The "low" diagnosis needs to be based on UF/IFAS interpretative thresholds.

^t Plant nutritional status must be diagnosed every week to repeat supplemental fertilizer application.

^s Supplemental fertilizer applications are allowed when irrigation is scheduled following a recommended method (see Chapter 3 on irrigation scheduling in Florida). Supplemental fertilizations is to be applied in addition to base fertilization when appropriate. Supplemental fertilization is not to be applied "in advance" with the preplant fertilizer.

^r A leaching rain is defined as a rainfall amount of 3 inches in 3 days or 4 inches in 7 days.

^q Supplemental amount for each leaching rain

^p Plant nutritional status must be diagnosed after each harvest before repeating supplemental fertilizer application.

Table 4. Plant tissue analysis at early fruit set for eggplant. Dry weight basis.

Status	N	P	K	Ca	Mg	S	Fe	Mn	Zn	B	Cu	Mo
	Percent						Parts per million					
Deficient	<4.2	0.3	3.5	0.8	0.25	0.4	50	50	20	20	5	0.5
Adequate range	4.2-5.0	0.3-0.6	3.5-5.0	0.8-1.5	0.25-0.6	0.4-0.6	50-100	50-100	20-40	20-40	5-10	0.5-0.8
High	>6.0	0.6	5.0	1.5	0.6	0.6	100	100	40	40	10	0.8

Table 5. Sufficiency ranges for petiole sap testing for eggplant.

Crop development stage	Fresh petiole sap concentration (ppm)	
	NO ₃ -N	K
First fruit (two-inches long)	1200-1600	4500-5000
First harvest	1000-1200	4000-4500
Mid harvest	800-1000	3500-4000

Table 6. Chemical weed controls: eggplant.

Herbicide	Labeled crops	Time of application to crop	Rate (lbs. AI./Acre)	
			Mineral	Muck
Bensulide (Prefar 4E)	Eggplant	Preplant incorporate Preemergence	5-6.0	---
Remarks: Preplant incorporate using power driven cultivators or apply preemergence and incorporate with irrigation. Controls many grass weeds. Provides fair to good control of lambsquarter, purslane and amaranths. May be applied under polyethylene mulch.				
Carfentrazone (Aim)	Eggplant	Preplant Directed-hooded Row-middles	0.031	0.031
Remarks: Aim may be applied as a preplant burndown treatment and/or as a post-directed hooded application to row middles for the burndown of emerged broadleaf weeds. may be tank mixed with other registered herbicides. May be applied at up to 2 oz (0.031 lb ai). Use a quality spray adjuvant such as crop oil concentrate (coc) or non-ionic surfactant at recommended rates.				
Clethodim (Select) (Arrow) (Intensity) (Select Max)	Eggplant	Postemergence	0.1-0.25	0.1-0.25
Remarks: Use Select for the control of annual and perennial grasses. Use a crop-oil concentrate at 1% v/v in the finished spray volume. Do not apply more than 8 fl. oz. product/A per application. Do not apply within 20 days of harvest. Rates for Select Max range from 9-16 fl oz/A with the use of a non ionic surfactant.				
DCPA (Dacthal W-75)	Eggplant	Posttransplanting after crop establishment	6.0-8.0	---
Remarks: Controls germinating annuals. Apply to moist, weed-free soil 4 to 6 weeks after transplanting when crop is growing rapidly. May be applied to row middles after crop establishment. Note label precautions of planting non-registered crops within 8 months.				
Flumioxazin (Chateau)	Fruiting Vegetables, Eggplant	Directed Row Middles	0.125	---
Remarks: Chateau may be applied up to 4oz product/application to row middles of raised plastic-mulched beds that are at least 4 inches higher than the treated row middle and the mulched bed must be a minimum of a 24-inch bed width. Do not apply after crops are transplanted/seeded. All applications must be made with a shielded or hooded equipment. For control of emerged weeds, a burn down herbicide may be tank-mixed. Label is a Third-Party registration (TPR,Inc). Use without a signed authorization and waiver of liability is a misuse of the product.				

Table 6. Continued.

Herbicide	Labeled crops	Time of application to crop	Rate (lbs. AI./Acre)	
			Mineral	Muck
Glyphosate (Roundup, Durango) (Touchdown, Glyphomax)	Eggplant	Chemical fallow Preplant, pre emergence, Pre transplant	0.3-1.0	---
Remarks: Roundup, Glyphomax and Touchdown have several formulations Check the label of each for specific labeling directions.				
Halosulfuron (Sanda)	Eggplant	Row middles	0.024-0.048	
Remarks. Sandea may be applied between the rows of eggplant for the control of nutsedges and other listed broadleaf weeds. Avoid contact of the herbicide with the crop. Applications to be made at 0.5 to 1 oz. product/A. Do not apply more than 2 oz. per crop cycle. Use a surfactant in the spray mix.				
Lactofen (Cobra)	Fruiting Vegetables	Row middles	0.25-0.5	---
Remarks. Third Party label for use pre-transplant or post transplant shielded or hooded to row middles. Apply 16 to 32 fluid oz per acre. A minimum of 24 fl oz is required for residual control. Add a COC or non-ionic surfactant for control of emerged weeds. 1 pre and 1 post application may be made per growing season. Cobra contacting green foliage or fruit can cause excessive injury. Drift of Cobra treated soil particles onto plants can cause contact injury. Do not apply within 30 days of harvest. The supplemental label must be in the possession of the user at the time of application.				
Napropamide (Devrinol 50 DF)	Eggplant (transplanted)	Preplant	1.0 - 2.0	---
Remarks: Apply to weed-free soil surface. May be applied to transplant crop only. Incorporate the same day as applied, to a depth of 1 to 2 inches.				
Paraquat (Gramoxone Inteon) (Firestorm) (Parazone)	Eggplant	Preplant Preemergence	0.5 - 1.0	---
Remarks: Apply as a band treatment over the crop row or as a broadcast treatment before, during or after planting, but before the emergence of the crop. Weeds emerging after the application will not be controlled. Crop plants emerged at the time of application will be killed. Use a non-ionic surfactant in the spray mixture.				
Paraquat (Gromaxone Inteon) (Firestorm) (Parazone)	Eggplant	Postemergence directed/shielded	0.5	
Remarks: For control of emerged weeds between rows after crop establishment. Do not exceed 30 psi nozzle or spray under conditions which could cause drift. Apply when weeds are succulent and weed growth is under 6 inches. Do not apply more than 3 applications per season. Add a non-ionic surfactant or crop oil to spray mixture.				
Pelargonic acid (Scythe)	Fruiting Vegetable (Eggplant)	Preplant Preemergence Direct-Shielded	3-10% v/v	--
Remarks: Product is a contact nonselective, foliar applied herbicide. It does not have residual activity. May be tank mixed with soil residual herbicides. Consult label for rates.				
S-Metolachlor	Eggplant	Pre transplant	0.64-0.95	--
Dual Magnum		Post transplant	0.95	
Remarks: Eggplant has been added to the TPR, Inc (Third Party) pepper label. For pretransplant apply as a directed spray to pre-formed beds at 0.67 to 1 pint per acre. For post transplant, apply as a directed shielded spray to the row middles. So not harvest within 60 days of applications.				
Sethoxydim (Poast)	Eggplant	Postemergence	0.188 - 0.28	0.188 - 0.28
Remarks: Controls actively growing grass weeds. A total of 4.5 pts. product per acre may be applied in one season. Do not apply within 20 days of harvest. Apply in 5 to 20 gals. of water adding 2 pts. of crop oil concentrate per acre. Unsatisfactory results may occur if applied to grasses under stress. Use 0.188 lb. ai. (1 pt.) to seedling grasses and up to 0.28 lb. ai. (1.5 pts.) to perennial grasses emerging from rhizomes, etc. Consult label for grass species and growth stage for best control.				
Trifluralin (Trifluralin) (Truflan)	Eggplant	Preplant incorporated	0.5	
Remarks: Apply and incorporate before transplanting. Incorporate to a depth of 3 inches.				

Table 7. Disease management for eggplant.

Chemical	Fungicide Group	Maximum Rate per acre per		Min Days To Harvest	Pertinent Diseases or Pathogens	Remarks
		Application	Season			
Acrobat 50 WP (dimethomorph)	40	6.4 oz.	32 oz.	0	Phytophthora blight	Must be applied as a tank mix with another fungicide active against Phytophthora blight; Do not make more than two sequential applications.
Actinovate AG (<i>Streptomyces lydicus</i> WYEC 108)	Biological material	12 oz.		0	Soil pathogens: <i>Fusarium</i> , <i>Rhizoctonia</i> , <i>Pythium</i> , <i>Phytophthora</i> Foliar diseases: <i>Alternaria</i> , <i>Anthracnose</i> , <i>Sclerotinia</i>	Use as soil drench and foliar sprays; Foliar application with a spread sticker to ensure best results.
Allegiance FL (metalaxyl)	4	0.75 fl oz/100 lb. seed			Pythium damping-off	Seed treatment
Alude, Phosphite Fungicide, Fungi-Phite, Helena Prophyt, Phorcephite, Rampart, Reveille, Topaz Fungicide (potassium phosphite)	33	See label	See label	0	<i>Pythium</i> , <i>Phytophthora</i> spp. and others See label	See label
Apron XL (mefenoxam)	4	0.64 fl oz/100 lb seed			Pythium damping-off	Do not apply a preplant or an at-plant application of mefenoxam or metalaxyl products to seed treated with Apron XL.
Armicarb 100 fungicide, Kaligreen, Milstop (potassium bicarbonate)	NC	See label		Kaligreen 1 Milstop 0	Anthracnose, <i>Alternaria</i> early blight, Gray mold, leaf spot, powdery mildew	See label
Badge SC (copper hydroxide; copper oxychloride)	M1 & M1	1.5 pt.			<i>Alternaria</i> blight, Anthracnose, Phomopsis blight	Apply prior to start of symptoms; Applied in a spray solution with a pH higher than 6.5 to avoid phytotoxicity
Bravo Weather Stik (chlorothalonil)	M5	1.5 pt.	12 lb	3	Anthracnose, Powdery mildew	Refer to label
Cabrio EG (pyraclostrobin)	11	16 oz	96 oz	0	Anthracnose, Early blight, Leaf spot	Do not use for greenhouse and transplant production; Alternate with other labeled fungicides after each application
Cease (<i>Bacillus subtilis</i> strain QST 713)	44	6 qt		0	Powdery mildew, Early blight	Do not combine with pesticides, surfactants or fertilizers for application through chemigation without prior experience
Champ DP Dry Prill, Champ Formula 2 Flowable, Champ WG, Champion Wettable Powder, Kentan DF (copper hydroxide)	M1	See label	See label		Anthracnose, <i>Alternaria</i> blight, Phomopsis blight	See label
Chloronil 720 (chlorothalonil)	M5	1.5 pt	12 pt	3	Anthracnose, Powdery mildew, Leaf spot	Apply by ground, air or chemigation
COC CF, COC WP (copper oxychloride)	M1	4 lb			Anthracnose, <i>Alternaria</i> blight, Phomopsis blight	See label for details
Copper-Count-N (copper ammonium complex)	M1	2 qt			Anthracnose, <i>Alternaria</i> blight, Phomopsis blight	

Table 7. Continued.

Chemical	Fungicide Group	Maximum Rate per acre per		Min Days To Harvest	Pertinent Diseases or Pathogens	Remarks
		Application	Season			
Cueva (copper octanoate)	M1	2 gal		0	Anthracnose, Alternaria blight,	See label
Cuprofix Ultra 40 Disperss (basic copper sulfate)	M1	1.25 lb			Alternaria blight, Anthracnose, Phomopsis blight	Applicable to greenhouse or shadehouse production
Defiant (thiram)	M3	4 oz/100 lb seed			Damping-off, seed decay, seedling blights	Do not plant treated seed by broadcasting to the soil surface
Endura (boscalid)	7	3.5 oz	21 oz	0	Alternaria blight	Do not more than 2 sequential before alternating with other labeled fungicides with a different mode of action.
Evito 480 SC (fluoxastrobin)	11	5.7 fl oz 5.7 fl oz	22.8 fl oz	3	Phytophthora blight Early blight	Do not apply in a greenhouse
Flint Fungicide (trifloxystrobin)	11	4 oz 3.0 oz	16 oz	3	Phytophthora blight Early blight	Do not apply more than five applications per season; Must be tank mixed and alternated with a protectant fungicide for late blight control
Forum Fungicide (dimethomorph)	40	6 oz	30 oz	0	Phytophthora blight	Do not make more than 2 sequential applications; Do not make more than 5 applications per season
Heritage (azoxystrobin)	11	8.0 oz	32 oz	0	Anthracnose Powdery Mildew	Do not make more than 2 sequential applications; Do not make more than 4 applications per season
Kocide 3000, Kocide 2000, Kocide DF (copper hydroxide)	M1	See label	See label	0	Alternaria blight, Anthracnose, Phomopsis blight	Applied in a spray solution with a pH higher than 6.5 to avoid phytotoxicity
Kumulus DF Fungicide-Acaricide, Micro Sulf, Microfine Sulfur, Microthiol Disperss, Yellow Jacket Wettable Sulfur (sulfur)	M2	See label	See label		Powdery mildew	See label for details
Maneb 75 DF, Maneb 80WP Fungicide, Manex Fungicide (maneb)	M3	2.0 lb (Manex 1.6 qt)	14 lb (Manex 11.2 qt)	5	Alternaria blight, Anthracnose, Cladosporium leaf mold, Gray leaf spot, Septoria leaf spot	See label
Maxim 4FS (fludioxonil)	12	0.16 fl oz/100 lb seed			Seed decay, damping-off, seedling blight caused by soil pathogens <i>Fusarium Rhizoctonia</i> , <i>Helminthosporium</i> , <i>Aspergillus</i> and <i>Penicillium</i> .	Not effective against <i>Pythium</i> spp.; Apply Maxim 4FS tanked mix with others for <i>Pythium</i> control
Metastar 2E AG (metalaxyl)	4	8 pt	12 pt	7	<i>Pythium</i> damping-off, Crown rot by <i>Phytophthora capsici</i>	Apply preventatively; do not use in greenhouse
PlantShield HC (<i>Trichoderma harzianum</i> Rifai strain KRL-AG2)	NC	5.0 oz		0	<i>Pythium</i> diseases	Apply via ground application only

Table 7. Continued.

Chemical	Fungicide Group	Maximum Rate per acre per		Min Days To Harvest	Pertinent Diseases or Pathogens	Remarks
		Application	Season			
Presidio (fluopicolide)	43	4 fl oz	12 fl oz	2	Late blight Phytophthora blight	Must be tank mixed and alternated with another labelled fungicide having a different mode of action for resistance management
Quadris (azoxystrobin)	11	15 fl oz	1 lb. a.i.	0	Powdery mildew Anthracnose	Refer to label
Rally 40 WSP (myclobutanil)	3	5.0 oz	20.0 oz	0	Powdery mildew	Do not make more than 4 applications per season
Reason 500 SC (fenamidone)	11	8.2 fl oz	24.6 fl oz	14	Phytophthora blight	Ground application only
		8.2 fl oz			Early blight	Refer to label
Regalia (extract of <i>Reynoutria sachalinensis</i>)	P	4 qt		0	Powdery mildew, Gray mold, Early blight	Tank mix with other registered fungicides when disease pressure is high
Rhapsody (<i>Bacillus subtilis</i> strain QST 713)	44	6 qt		0	Early blight Powdery mildew	Refer to label
Ridomil Gold SL (mefenoxam)	4	1 pt		7	<i>Pythium</i> spp. Phytophthora blight	Do not exceed the use of 1.5 lbs. a.i./A for soil application and 0.5 lb. a.i. for foliar application
Serenade ASO, Serenade MAX, Serenade SOIL (<i>Bacillus subtilis</i> strain QST 713)	44	ASO 6 lb MAX 3 lb SOIL 6 qt		0	Powdery mildew, Gray mold, Early blight, Rhizoctonia, Pythium, Phytophthora, <i>Fusarium</i>	See label
SoilGard 12G (<i>Gliocladium virens</i> GI-21)	Biological material	Before/at transplanting, 2 lb; after transplanting, 10 lb		0	Damping-off or root rot caused by soil pathogens such as <i>Pythium</i> , <i>Rhizoctonia</i> , spp.	Apply preventatively; Do not use other fungicides with SoilGard 12G
Sonata (<i>Bacillus pumilus</i> strain QST 2808)	Biological material	4 qt		0	Early blight, Powdery mildew	Can be used alone or in alternating spray programs or tank mixes
Sporatec (rosemary oil, clove oil, thyme oil)	NC	3.0 pts	Spray as needed	0	Early blight, Powdery mildew	Use of a spreader and/or penetrating adjuvant improves product performance

Table 8. Selected insecticides approved for use on insects attacking eggplant.

Trade Name (Common Name)	Rate (product/acre)	REI (hours)	Days to Harvest	Insects	MOA Code ¹	Notes
Acramite-50WS (bifenazate)	0.75-1.0 lb	12	3	twospotted spider mite	un	One application per season.
Actara (thiamethoxam)	2.0-5.5 oz	12	0	aphids, Colorado potato beetle, flea beetles, leafhoppers, stink bugs, whiteflies	4A	Maximum of 11 oz/acre per season. Do not use if a soil application of a neonicotinoid has been used .
Admire Pro (imidacloprid)	7-10.5 fl oz	12	21	aphids, Colorado potato beetle, flea beetles, foliar-feeding thrips, leafhoppers, whiteflies	4A	Most effective if applied to soil at transplanting.
Admire Pro (imidacloprid)	0.44 fl oz/10,000 plants	12	21	aphids, whiteflies	4A	Planthouse: 1 application. See label.
*Agri-Mek 0.15EC (abamectin)	8-16 fl oz	12	7	broad mite, Colorado potato beetle, <i>Liriomyza</i> leafminers, spider mites, <i>Thrips palmi</i> , tomato pinworm, tomato russet mite	6	Do not use on transplants. No more than 2 sequential applications.
*Ambush 25W (permethrin)	6.4-12.8 oz	12	3	cabbage looper, Colorado potato beetle, flea beetles, leafminers	3	Do not apply more than 2 lb ai per acre per season. (128 oz)
*Asana XL (0.66 EC) (esfenvalerate)	5.8-9.6 fl oz	12	7	Colorado potato beetle, corn earworm, flea beetle, loopers	3	Do not apply more than 0.35 lb ai per acre per season.
Assail 70WP Assail 30 SG (acetamiprid)	0.6-1.7 oz 1.5-4.0 oz	12	7	aphids, Colorado potato beetle, thrips, whiteflies	4A	Begin applications for whiteflies when first adults are noticed. Do not apply more than 4 times per season or apply more often than every 7 days.
Avaunt (indoxacarb)	2.5-3.5 oz	12	3	beet armyworm, loopers, southern armyworm, tomato fruitworm, tomato pinworm	22	Do not apply more than 14 oz of Avaunt per acre per crop. Minimum spray interval is 5 days.
Aza-Direct (azadirachtin)	1-2 pts, up to 3.5 pts, if needed	4	0	aphids, beetles, caterpillars, leafhoppers, leafminers, mites, stink bugs, thrips, weevils, whiteflies	un	Antifeedant, repellent, insect growth regulator. OMRI-listed .
Azatin XL (azadirachtin)	5-21 oz	4	0	aphids, beetles, caterpillars, leafhoppers, leafminers, thrips, weevils, whiteflies	un	Antifeedant, repellent, insect growth regulator
*Baythroid XL (beta-cyfluthrin)	1.6-2.8 fl oz	12	7	cabbage looper, Colorado potato beetle, garden symphylan, garden webworm, potato aphid, potato leafhopper, stink bugs, tomato fruitworm, tomato hornworm, beet and southern armyworm (1 and 2 instar), thrips (except <i>Thrips palmi</i>), tomato pinworm, flea beetles	3	Do not apply at less than 7-day intervals, maximum amount per season: 16.8 fl oz per acre.
Belay 50 WDG (clothianidin)	1.6-2.1 oz	12	7	aphids, Colorado potato beetle, flea beetles, leafhoppers, leafminers (suppression), Lygus, stink bugs, whiteflies (suppression)	4A	Do not apply more than 6.4 oz per acre per season. Do not use an adjuvant. Toxic to bees. Do not release irrigation water from the treated area.
Belay 50 WDG (clothianidin)	4.8 -6.4 oz (soil application)	12	Apply at planting	aphids, Colorado potato beetle, flea beetles, leafhoppers, leafminers (suppression), Lygus, foliar feeding thrips, whiteflies (suppression)	4A	Do not apply more than 6.4 oz per acre per season. See label for application instructions. Do not release irrigation water from the treated area.

Table 8. Continued.

Trade Name (Common Name)	Rate (product/acre)	REI (hours)	Days to Harvest	Insects	MOA Code ¹	Notes
Beleaf 50 SG (flonicamid)	2.0-2.8 oz	12	0	aphids, plant bugs	9C	Do not apply more than 8.4 oz/acre per season. Begin applications before pests reach damaging levels.
Biobit HP (<i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i>)	0.5-2.0 lb	4	0	caterpillars (will not control large armyworms)	11	Treat when larvae are young. Good coverage is essential. Can be used in the greenhouse. OMRI-listed.
BotaniGard 22 WP, ES (<i>Beauveria bassiana</i>)	WP: 0.5-2.0 lb/100 gal ES: 0.5-2 qts/100 gal	4	0	aphids, thrips, whiteflies	--	May be used in greenhouses. Contact dealer for recommendations if an adjuvant must be used. Not compatible in tank mix with fungicides.
*Brigade 2EC (bifenthrin)	2.1-6.4 fl oz	12	7	armyworms, cabbage looper, Colorado potato beetle, corn earworm, cucumber beetles, flea beetles, <i>Lygus</i> spp., mites, plant bugs, stink bugs, thrips, tomato hornworm, tomato pinworm, vegetable leafminer, whiteflies	3	Do not make applications less than 7 days apart. Do not apply more than 0.2 lb active ingredient per acre per season.
Checkmate TPW-F (pheromone)	1.2-6.0 fl oz	0	0	tomato pinworm	--	For mating disruption see label.
Confirm 2F (tebufenozide)	6-16 fl oz	4	7	beet armyworm, black cutworm, cabbage looper, fall armyworm, southern armyworm, tobacco hornworm, tomato hornworm, true armyworm, yellowstriped armyworm	18	Do not apply more than 16 ounces per application or more than 64 ounces product per season.
Coragen (rynaxypyr)	3.5-7.5	4	1	beet armyworm, Colorado potato beetle, fall armyworm, hornworms, leafminer larvae, loopers, southern armyworm, tomato fruitworm, tomato pinworm	28	May be applied by drip chemigation - see label.
Courier 40SC (buprofezin)	9.0-13.6 fl oz	12	1	leafhoppers, mealybugs, planthoppers, whiteflies	16	Immature insects only. No more than 2 applications per crop cycle.
Crymax WDG (<i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i>)	0.5-2.0 lb	4	0	caterpillars	11	Use high rate for armyworms. Treat when larvae are young.
Danitol 2.4 EC (fenpropathrin)	10.67 fl oz	24	3	fruitworm, stink bug, tobacco hornworm, twospotted spider mite, yellowstriped armyworm	3	Maximum of 4 applications (0.8 lb ai/acre) per season.
Deliver (<i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i>)	0.25-1.5 lb	4	0	caterpillars	11	Use higher rates for armyworms. OMRI-listed.
Dibrom 8 EC (naled)	1 pt	48	1	aphids, blister beetles, flea beetles, leafminers, mites	1B	Apply no more than 1 pt/acre in Florida. Do not apply when temperature is over 90°F.
DiPel DF (<i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i>)	0.5-2.0 lb	4	0	caterpillars	11	Treat when larvae are young. Good coverage is essential. Can be used in greenhouses. OMRI listed.

Table 8. Continued.

Trade Name (Common Name)	Rate (product/acre)	REI (hours)	Days to Harvest	Insects	MOA Code ¹	Notes
*Durivo (thiamethoxam, chlorantraniliprole)	10-13 oz	12	30	aphids, beet armyworms, Colorado potato beetle, fall armyworm, flea beetles hornworms, leafhoppers, loopers, southern armyworm, thrips, tomato fruitworm, tomato pinworm, whiteflies, yellowstriped armyworm	4A, 28	May be applied to soil by one of several methods—see label.
Entrust (spinosad)	0.5-2.5 oz	4	1	armyworms, flower thrips, hornworms, leafminers, loopers, other caterpillars, <i>Thrips palmi</i> , tomato fruitworm, tomato pinworm	5	No more than 9 oz per acre per crop. OMRI-listed .
Esteem Ant Bait (pyriproxyfen)	1.5-2.0 lb	12	1	red imported fire ant	7C	Apply when ants are actively foraging.
Extinguish ((S)-Methoprene)	1.0-1.5 lb	4	0	fire ants	7A	Slow-acting IGR (insect growth regulator). Best applied early spring and fall where crop will be grown. Colonies will be reduced after three weeks and eliminated after 8 to 10 weeks. May be applied by ground equipment or aerially.
Fulfill (pymetrozine)	2.75 oz	12	0	green peach aphid, potato aphid, suppression of whiteflies	9B	Apply before populations build to damaging levels. Minimum of 7 days between applications. Do not make more than two applications.
Intrepid 2F (methoxyfenozide)	4-16 fl oz	4	1	beet armyworm, cabbage looper, fall armyworm, hornworms, southern armyworm, tomato fruitworm, true armyworm, yellowstriped armyworm	18	Do not apply more than 16 oz per application or more than 64 oz product per season.
Javelin WG (<i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i>)	0.12-1.50 lb	4	0	most caterpillars, but not <i>Spodoptera</i> species (armyworms)	11	Treat when larvae are young. Thorough coverage is essential. OMRI-listed .
Knack IGR (pyriproxyfen)	8-10 fl oz	12	1	immature whiteflies	7C	Apply when nymphs first appear. Make no more than two applications. Supplemental label for PHI.
Kryocide (cryolite)	8-16 lb	12	14	blister beetles, cabbage looper, Colorado potato beetle larvae, flea beetles, fruitworm, hornworms, tomato pinworm	un	Do not exceed 64 lb per acre per season.
*Lannate LV; *SP (methomyl)	LV: 0.75-3.0 pt SP: 0.25-1.0 lb	48	5	beet armyworm, corn earworm, green peach aphid, tomato pinworm (ground application only)	1A	No more than 10 applications per crop and no more than 15 pt LV/acre/crop or 5 lb SP.
Malathion 8F (malathion)	0.75-3.5 pt	12	3	aphids, lace bugs, spider mites	1B	Can be used in greenhouse.
Movento (spirotetramat)	4.0-5.0 fl oz	24	1	aphids, psyllids, whiteflies	23	Maximum of 10 fl oz per acre per season.
M-Pede 49% EC (soap, insecticidal)	1-2% V/V	12	0	aphids, leafhoppers, mites, plant bugs, thrips, whiteflies	--	OMRI-listed .

Table 8. Continued.

Trade Name (Common Name)	Rate (product/acre)	REI (hours)	Days to Harvest	Insects	MOA Code ¹	Notes
*Mustang (zeta-cypermethrin)	2.4-4.3 oz	12	1	brown stink bugs, cabbage looper, Colorado potato beetle, cutworms, fall armyworm, flea beetles, grasshoppers, green stink bugs, hornworms, leafhoppers, pepper weevil, plant bugs, southern armyworm, tomato fruitworm, tomato pinworm, true armyworm, yellowstriped armyworm	3	Do not make applications less than 7 days apart. Do not apply more than 0.3 lb ai/acre per season.
Neemix 4.5 (azadirachtin)	4-16 fl oz	12	0	aphids, armyworms, cabbage looper, Colorado potato beetle, cutworms, hornworms, leafminers, saltmarsh caterpillar, thrips, tomato fruitworm (corn earworm), tomato pinworm, whiteflies	un	OMRI-listed .
Oberon 2SC (spiromesifen)	7.0-8.5 fl oz	12	7	broad mites, twospotted spider mite, whiteflies (eggs and nymphs)	23	Maximum amount per crop: 25.5 fl oz/acre. No more than 3 applications.
Platinum Platinum 75SG (thiamethoxam)	5.0-11.0 fl oz 1.66-367.0z	12	30	aphids, Colorado potato beetle, flea beetles, leafhoppers, thrips, tomato pinworm, whiteflies	4A	For most crops that are not on the label, a 120-day plant-back interval must be observed. To manage resistance, avoid using Provado or other related pesticides (Actara, Assail) in conjunction with Platinum.
Portal (fenpyroximate)	2 pt	12	1	mites, including broad mites	21A	Do not make more than 2 applications per season.
*Pounce 25 W (permethrin)	6.4-9.6 oz	12	3	cabbage looper, Colorado potato beetle, flea beetles, vegetable leaf-miner	3	Do not apply more than 0.6 lbs ai/acre per season.
*Proaxis Insecticide (gamma-cyhalothrin)	1.92-3.84 fl oz	24	5	Aphids , beet armyworm , blister beetles, cabbage looper, Colorado potato beetle, cucumber beetles (adults), cutworms, hornworms, fall armyworm , flea beetles, grasshoppers, leafhoppers, plant bugs, southern armyworm , spider mites , stink bugs, thrips , tobacco budworm, tomato fruitworm, tomato pinworm, vegetable weevil (adult), whiteflies , yellowstriped armyworm	3	Suppression only. First and second instars only. Do not apply more than 2.88 pints per acre per season.
*Proclaim (emamectin benzoate)	2.4-4.8 oz	12	7	beet armyworm, cabbage looper, fall armyworm, hornworms, southern armyworm, tobacco budworm, tomato fruitworm, tomato pinworm, yellowstriped armyworm	6	No more than 28.8 oz/acre per season.
Provado 1.6F (imidacloprid)	3.8-6.2 oz	12	0	aphids, Colorado potato beetle, leafhoppers, whiteflies	4A	Do not apply if imidacloprid or thiamethoxam have been used at planting.
Pyrellin EC (pyrethrin + rotenone)	1-2 pt	12	12 hours	aphids, Colorado potato beetle, flea beetles, leafhoppers, leafminers, loopers, mites, stink bugs, thrips, whiteflies	3, 21	

Table 8. Continued.

Trade Name (Common Name)	Rate (product/acre)	REI (hours)	Days to Harvest	Insects	MOA Code ¹	Notes
Radiant (spinetoram)	5-10 fl oz	4	1	armyworms, Colorado potato beetle, flower thrips, hornworms, <i>Liriomyza</i> leafminers, loopers, <i>Thrips palmi</i> , tomato fruitworm, tomato pinworm	5	Maximum of 34 fl oz per acre per season.
Requiem 25EC (extract of <i>Chenopodium ambrosioides</i>)	2-4 qt	4	0	chili thrips, green peach aphid, <i>Liriomyza</i> leafminers, melon thrips, potato aphid, western flower thrips	un	Begin applications before pests reach damaging levels.
Rimon 0.83EC (novaluron)	9-12 fl oz	12	1	Armyworms, Colorado potato beetle, foliage feeding caterpillars, leafminers, stink bugs, thrips, tomato pinworm, whiteflies	15	Do not apply more than 36 fl oz per acre per season.
Sevin 80 S; XLR; 4F (carbaryl)	80S: 0.63-2.5 lb XLR, 4F: 0.5-2 qt	12	3	Colorado potato beetle, cutworms, fall armyworm, flea beetles, lace bugs, leafhoppers, stink bugs (suppression), tarnished plant bug, thrips (suppression), tomato fruitworm, tomato hornworm, tomato pinworm	1A	Do not apply more than seven times. Do not apply more than 8 qt or 10 lb per acre per crop. Applications must be at least 7 days apart.
SpinTor 2 SC (spinosad)	1.5-8 fl oz	4	1	armyworms, Colorado potato beetle larvae, hornworms, leafminers (<i>Liriomyza</i> spp.), loopers, thrips, tomato fruitworm, tomato pinworm	5	Control of leafminers and thrips may be improved by addition of an adjuvant to spray mixture. Do not apply more than three times in any 21-day period.
Synapse WG (flubendiamide)	2-3 oz	12	1	armyworms, hornworms, loopers, tomato fruitworm	28	Do not apply more than 9 oz/acre per season.
*Telone C-35 (dichloropropene + chloropicrin) *Telone II (dichloropropene)	See label	5 days	preplant	garden centipedes, wireworms	--	See supplemental label for use tin south and central Florida.
*Thionex 50W (endosulfan)	1-2 lb	48	1	Colorado potato beetle, blister beetle, flea beetles, green peach aphid, green stink bug, whiteflies	2	No more than 2 applications or 1.0 lb ai per year.
Trilogy (extract of neem oil)	0.5-2.0% V/V	4	0	aphids, mites, suppression of thrips and whiteflies	un	Apply morning or evening to reduce potential for leaf burn. Toxic to bees exposed to direct treatment. OMRI-listed .
Ultra-Fine Oil JMS Stylet-Oil Saf-T-Side Others (oil, insecticidal)	3-6 qts/100 gal (JMS) 1-2 gal/100 gal water	4	0	aphids, leafhoppers, leafminers, mites, thrips, whiteflies. Aphid transmitted viruses (JMS)	--	Do not exceed four applications per season. Stylet-oil will not control aphids or beetles. Organic Stylet-Oil and Saf-T-Side are OMRI-listed .
*Vendex 50 WP (fenbutatin-oxide)	2-3 lb	48	3	twospotted spider mite	12B	Apply when mites first appear, no more than 9 lb per year.
Venom Insecticide (dinotefuran)	foliar: 1-4 oz soil: 5-6 oz	12	foliar - 1 soil - 21	Colorado potato beetle, flea beetle, leafhopper, leafminer, thrips, whiteflies	4A	Do not use both application methods. Do not apply more than 6 oz, foliar; or 12 oz, soil, per season. No more than 3 applications per season.

Table 8. Continued.

Trade Name (Common Name)	Rate (product/acre)	REI (hours)	Days to Harvest	Insects	MOA Code ¹	Notes
Vetiva (flubendiamide and buprofezin)	12.0-17.0 fl oz	12	1	armyworms, cabbage looper, cutworms, garden webworm, suppression of leafhoppers and mealybugs, saltmarsh caterpillar, tobacco budworm, tomato hornworm, tomato fruitworm, tomato pinworm, suppression of whiteflies	28, 16	Do not apply more than 3 times per season or apply more than 38 fl oz per acre per season. Same active ingredients as Synapse, Coragen, and Courier.
Voliam Flexi (thiamethoxam, chlorantraniliprole)	4.0-7.0 oz	12	1	aphids, beet armyworm, Colorado potato beetle, fall armyworm, flea beetles, hornworms, leafhoppers, loopers, southern armyworm, stink bugs, tobacco budworm, tomato fruitworm, tomato pinworm, whiteflies, yellowstriped armyworm	4A/28	Limited to 14 oz/acre per year.
*Vydate L (oxamyl)	2-4 pt (foliar)	48	1	aphids, Colorado potato beetle, leafminers, mites	1A	Do not apply more than 24 pt per acre per season.
*Warrior II (lambda-cyhalothrin)	0.96-1.92 fl oz	24	5	armyworms (1 & 2 instar), cutworms, grasshoppers, hornworms, leafhoppers, loopers, plant bugs, stink bugs, thrips, tomato fruitworm, vegetable weevil. Suppression of aphids, mites, whiteflies	3	Do not apply more than 0.36 lb ai/acre per season. Does not control western flower thrips.
Xentari DF (<i>Bacillus thuringiensis</i> subspecies <i>aizawai</i>)	0.5-2.0 lb	4	0	caterpillars	11	Treat when larvae are young. Thorough coverage is essential. May be used in the greenhouse. Can be used in organic production.

The pesticide information presented in this table was current with federal and state regulations at the time of revision. The user is responsible for determining the intended use is consistent with the label of the product being used. Use pesticides safely. Read and follow label instructions.

¹ Mode of Action codes for vegetable pest insecticides from the Insecticide Resistance Action Committee (IRAC) Mode of Action Classification v. 6.1 August 2008.

- 1A. Acetyl cholinesterase inhibitors, Carbamates (nerve action)
- 1B. Acetyl cholinesterase inhibitors, Organophosphates (nerve action)
- 2A. GABA-gated chloride channel antagonists (nerve action)
- 3. Sodium channel modulators (nerve action)
- 4A. Nicotinic acetylcholine receptor agonists (nerve action)
- 5. Nicotinic acetylcholine receptor allosteric activators (nerve action)
- 6. Chloride channel activators (nerve and muscle action)
- 7A. Juvenile hormone mimics (growth regulation)
- 7C. Juvenile hormone mimics (growth regulation)
- 9B and 9C. Selective homopteran feeding blockers
- 10. Mite growth inhibitors (growth regulation)
- 11. Microbial disruptors of insect midgut membranes
- 12B. Inhibitors of mitochondrial ATP synthase (energy metabolism)
- 15. Inhibitors of chitin biosynthesis, type 0, lepidopteran (growth regulation)
- 16. Inhibitors of chitin biosynthesis, type 1, homopteran (growth regulation)
- 17. Molting disruptor, dipteran (growth regulation)
- 18. Ecdysone receptor agonists (growth regulation)
- 22. Voltage-dependent sodium channel blockers (nerve action)
- 23. Inhibitors of acetyl Co-A carboxylase (lipid synthesis, growth regulation)
- 28. Ryanodine receptor modulators (nerve and muscle action)
- un. Compounds of unknown or uncertain mode of action

² OMRI-listed: Listed by the Organic Materials Review Institute for use in organic production.

*** Restricted Use Pesticide**

Table 9. Breakeven production costs for eggplant at various yield levels in Palm Beach County area, 2005-2006.

	Cost per acre	Yield (ctn/acre)				
		800	1000	1200	1400	1600
Variable Costs	\$5,086.90	\$6.36	\$5.09	\$4.24	\$3.63	\$3.18
Fixed Costs	\$2,996.96	\$3.75	\$3.00	\$2.50	\$2.14	\$1.87
Harvest Cost/unit		\$2.85	\$2.85	\$2.85	\$2.85	\$2.85
Total Cost/unit		\$12.95	\$10.93	\$9.59	\$8.62	\$7.90